Math 102 See # 7

Quiz#3

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Name:

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Serial No.: $\boxed{1}$

1. Evaluate $I = \int_1^4 \frac{\ln 2 \log_2 s}{s} ds$.

(Q39, page 426)

$$I = \int_1^4 \frac{\cancel{\ln 2}\left(\frac{\ln s}{\cancel{\ln 2}}\right)}{s} ds \quad 1$$

$$= \int_1^4 \frac{\ln s}{s} ds = \left.\frac{(\ln s)^2}{2}\right]_1^4 \quad 1$$

3 pts

$$= \frac{1}{2}\left[(\ln 4)^2 - (\ln 1)^2\right]$$

$$= \frac{1}{2}(\ln 4)^2 = 2(\ln 2)^2 . \quad 1$$

2. Evaluate $\int_0^{\pi/2} 2\sinh(\sin\theta)\cos\theta \; d\theta = I$

when $\begin{cases} \boxed{\theta = 0}, & u = \sin 0 = 0 \\ \boxed{\theta = \frac{\pi}{2}}, & u = \sin\frac{\pi}{2} = 1 \end{cases}$ 1

let $\boxed{u = \sin\theta}$, $\boxed{du = \cos\theta \, d\theta}$,

$$I = 2\int_0^1 \sinh u \, du = 2 \left.\cosh u\right]_0^1 \quad 1$$

$$= 2\left[\cosh 1 - \cosh 0\right]$$

3 pts

$$= 2\left[\frac{e^1 + e^{-1}}{2} - \frac{e^0 + e^0}{2}\right]$$

$$= \left[e^1 + e^{-1} - 2\right] . \quad 1$$

(Q56, page 442)

3. Find $\int \sin\ (\ln x^2)\ dx$ $= I$

let $\boxed{u = \sin(\ln x^2), \quad dv = dx \quad du = \cos(\ln x^2)\cdot \frac{1}{x^2}\, 2x\,dx, \quad v = x}$ (1)

4 pts

then

$I = x\sin(\ln x^2) - \int \cancel{x} \cos(\ln x^2)\cdot \frac{2\cancel{x}}{\cancel{x^2}}\, dx$ (1)

$= x\sin(\ln x^2) - 2\int \cos(\ln x^2)\, dx$

let $\boxed{u = \cos(\ln x^2), \quad dv = dx \quad du = -\sin(\ln x^2)\,\frac{2x}{x^2}\,dx, \quad v = x}$ (1)

so $I = x\sin(\ln x^2) - 2\left[x\cos(\ln x^2) + 2\int \sin(\ln x^2)\,dx\right]$

$\Rightarrow \boxed{I = \frac{1}{5}\left[x\sin(\ln x^2) - 2x\cos(\ln x^2)\right] + c.}$ (1)

4. Evaluate $\int_1^e \frac{dt}{t\sqrt{1+(\ln t)^2}}$

(8.3)

Sorry this Q from 8.3